AIR FORCE OFFICE OF SCIENTIFIC RESEARCH

"Overview and Opportunities"

Summer 2002

The Basic Research Manager Of The AFRL

www.afosr.af.mil

Col Steve Reznick
Deputy Director &
Commander
703 696-7555

AFOSR MISSION

Manage The Basic Research Investment For The US Air Force

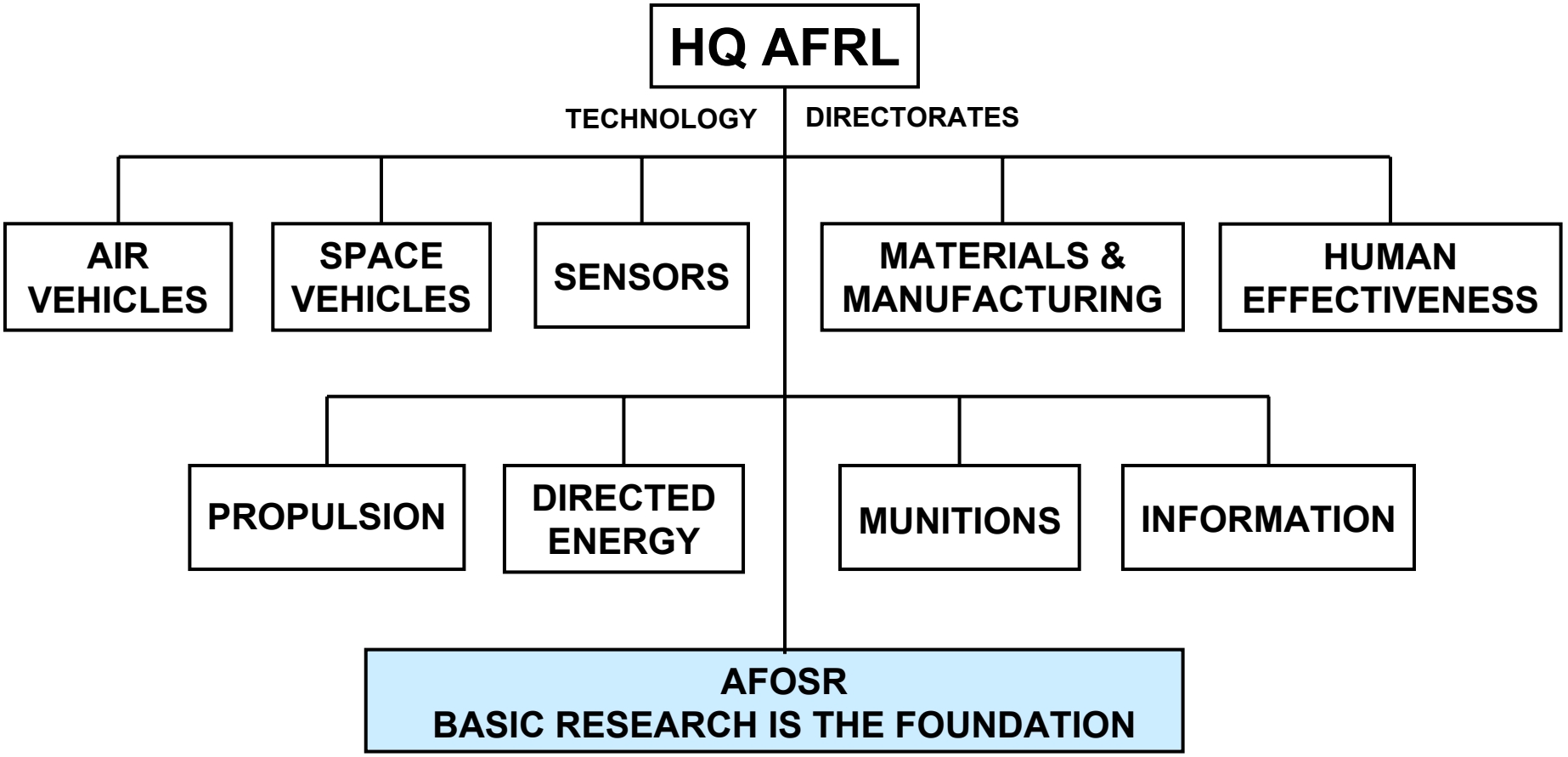
Partnerships in "Excellence with Relevance"

BASIC RESEARCH: A MILITARY NECESSITY

"The first essential of the airpower necessary for our national security is preeminence in research. The imagination and inventive genius of our people-in industry, in the universities, in the armed services, and throughout the nation must have free play, incentive, and every encouragement."

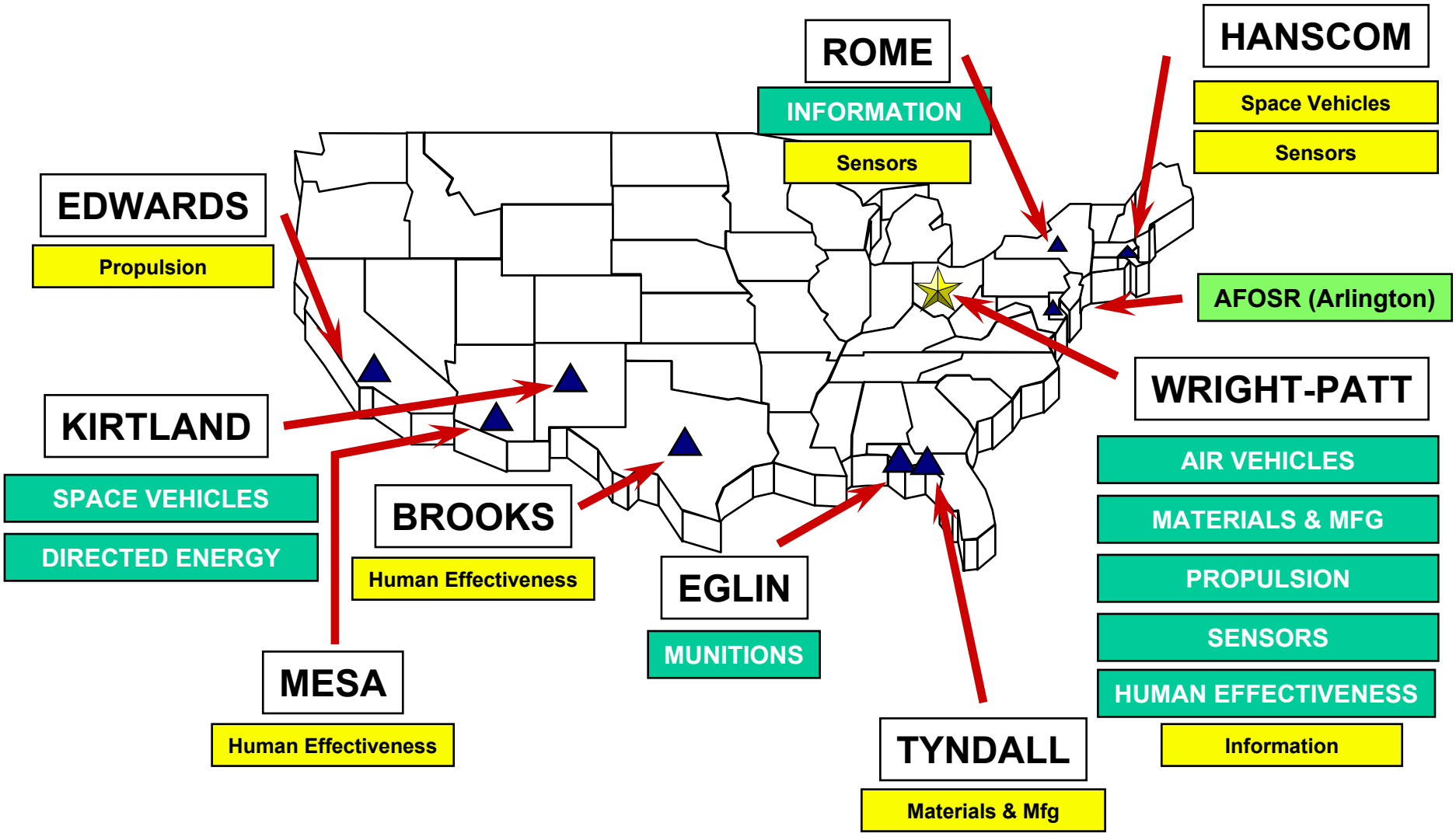
Gen. Henry "Hap" Arnold, 1944

AFOSR WITHIN AFRL

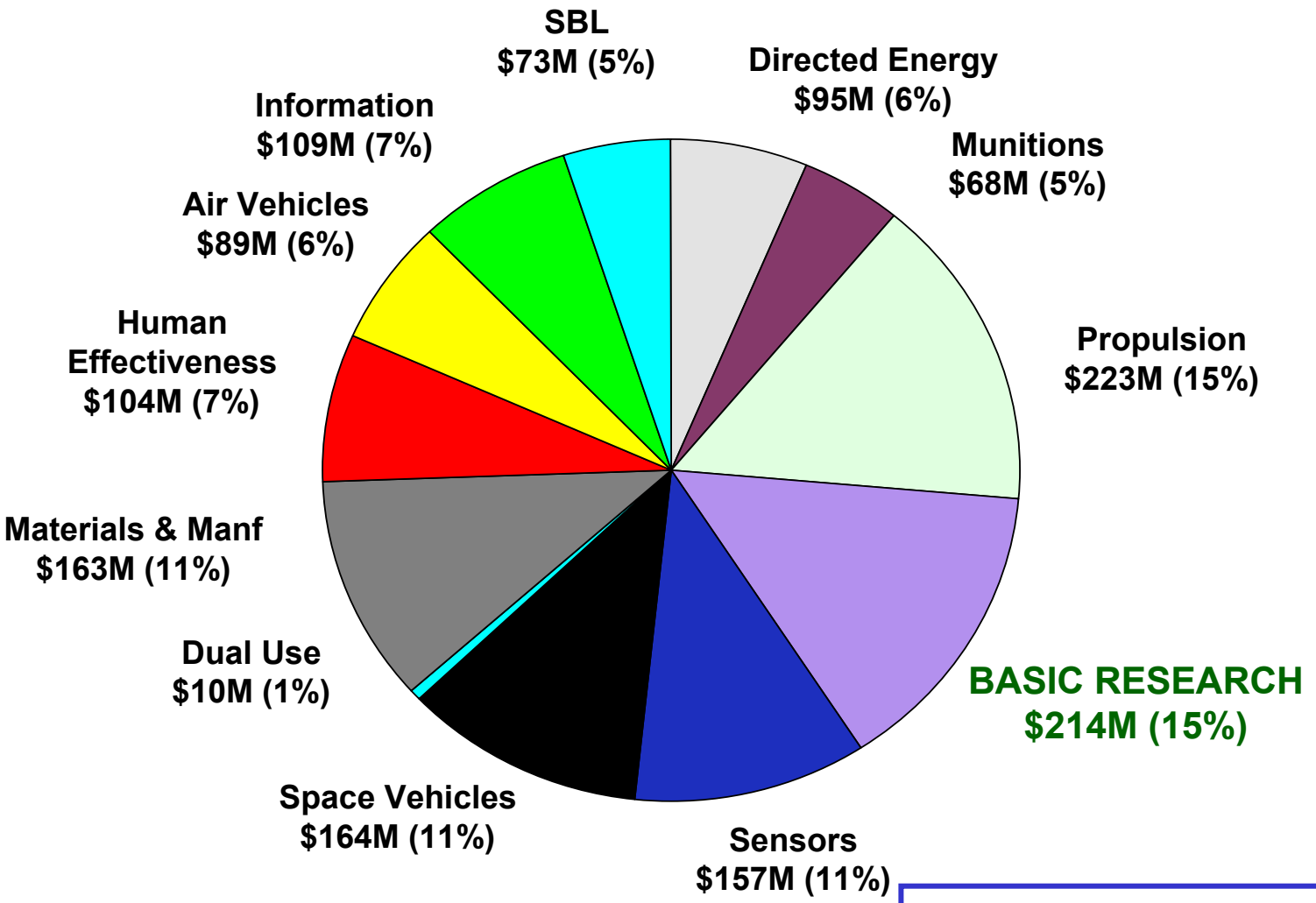


AFOSR is the Sole Manager of AF Basic Research (61102F Funds)

AFRL RESEARCH SITES



FY01 AF S&T INVESTMENT BY AFRL TECHNICAL DIRECTORATE *(APPROPRIATED $)*

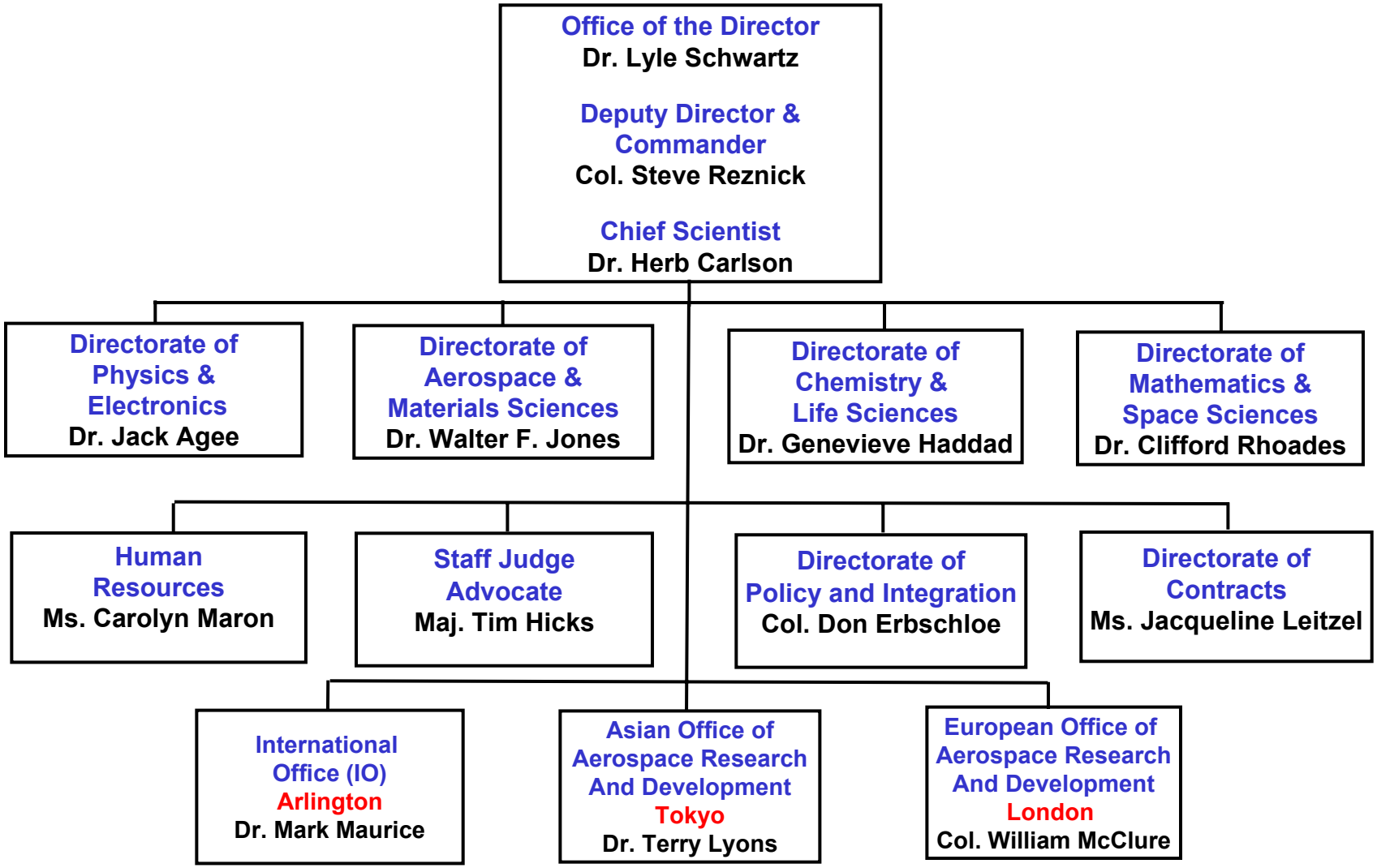


TOTAL=$1.469

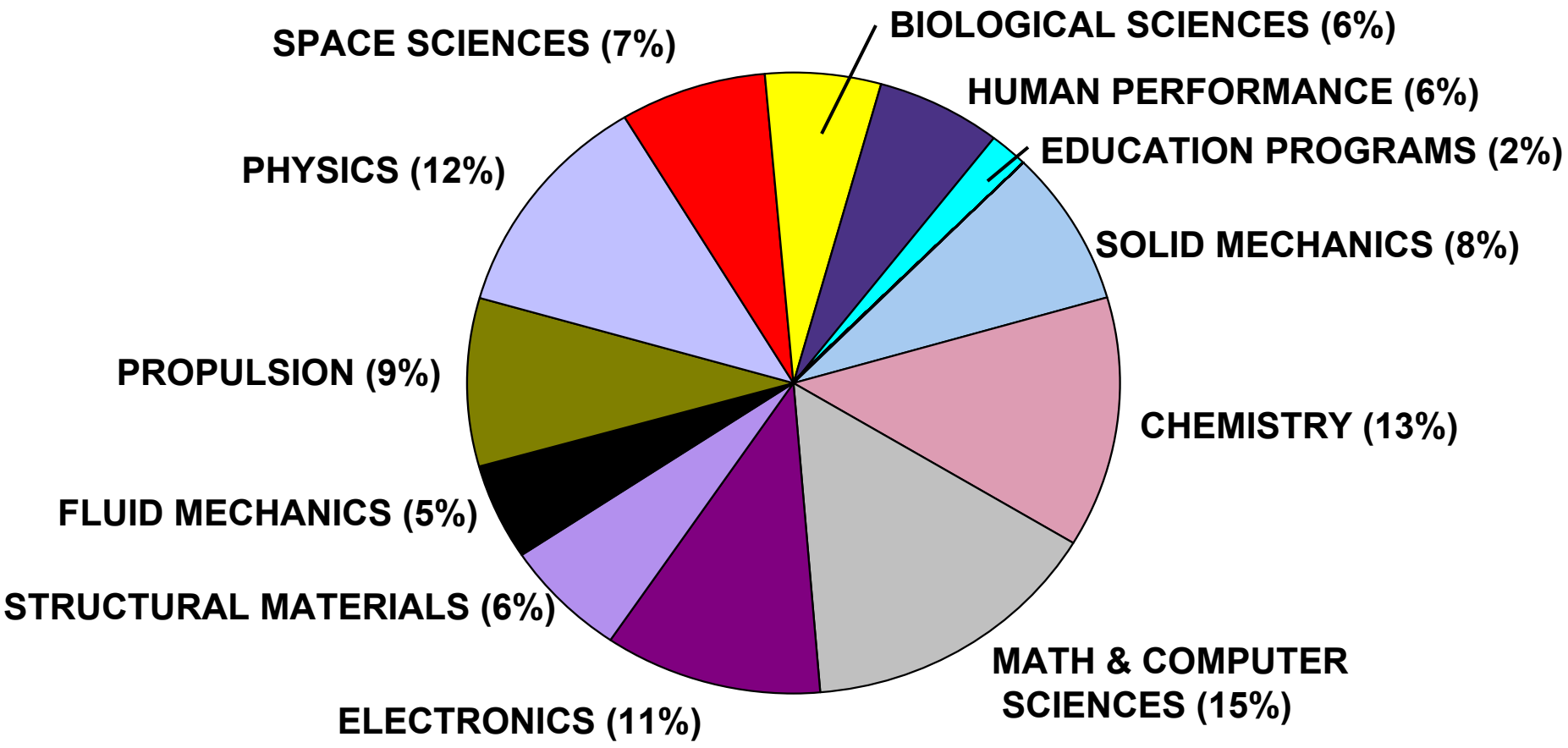
AFOSR POLICY

- AFOSR Investment Is *High-risk* And *High-payoff*
- *Invest Broadly* Across Air Force-Relevant Scientific Areas
- *Flexible Vertical* Integration (6.1 - 6.2 - 6.3)
- *Leverage* DoD, Other Agency, Private Sector And International Research
- Require *Excellence* And *Relevance*

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH



FY01 AF 6.1 INVESTMENT BY DISCIPLINE

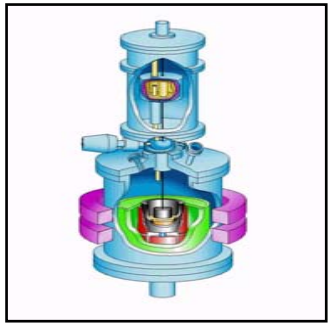


OFFICE OF SCIENTIFIC RESEARCH

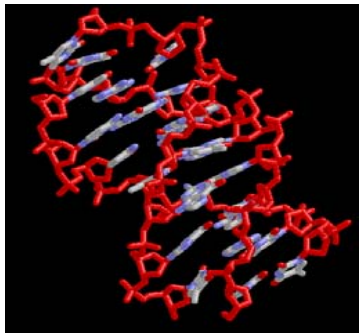
Technology Thrusts

Aerospace and Materials Sciences

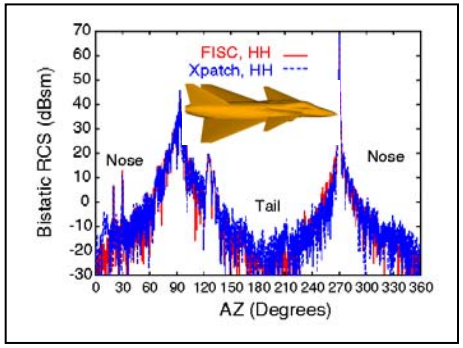
Physics and Electronics



Chemistry and Life Sciences



Mathematics and Space Sciences



Sub-thrusts

• Solid Mechanics and Structures • Materials • Fluid Mechanics • Propulsion	• Physics • Electronics	• Chemistry • Bio Sciences • Human Performance	• Mathematics • Computer Sciences • Space Sciences
• Smart Structures • Plasma Dynamics • Shape Memory Alloys	• Radiation Hardened Electronics • Microsatellites • Isomeric Energy Storage	• IR Biosensors • All-Nitrogen Fuel • Agile Laser Protection	• Identifying Hard Targets • Quantum Computers • Targeting Through Turbulence

Basic Research & Enabling Technologies

AEROSPACE AND MATERIALS SCIENCE

Technologies	Capability/Payoff
• High Cycle Fatigue	• Reduce Engine Fatigue
• Smart Skins/Adaptive Wings	• Increase Lift/Drag Ratio
• Structural Mechanics	• Reduce aerospace vehicle weight
• Metallic Materials	• Increase engine thrust to weight ratio
• Ceramic and Non-Metallic Materials	• Eliminate materials reliability issues
• Organic Matrix Composites	• Expand flight envelope and enhance maneuverability
• Unsteady Aerodynamics and Hypersonics	• Minimize events of engine stall
• Turbulence and Rotating Flows	• Reduce hypersonic drag
• Space Power and Propulsion	• Provide low cost, more flexible space access
• Combustion and Diagnostics	• Streamline aircraft and rocket propulsion system design

PHYSICS AND ELECTRONICS

Technologies	Capability/Payoff
• Lasers and Optical Physics	• Processing speeds orders of magnitude faster than today
• Atomic and Molecular Physics	• Recovery of images through atmospheric turbulence
• Plasma Physics	• Greater radiation tolerance
• Space Electronics, Sensors and Propulsion	• 1000 times improvement in data storage
• Optoelectronic Information Processing	• Expanded transmission bandwidth
• Semiconductor Materials	• Real-time adaptive signal and image processing
• High Power Microwaves	• Electronic Warfare and Non-Lethal Effects

CHEMISTRY AND LIFE SCIENCES

Technologies	Capability/Payoff
• All-Nitrogen Propellants	• Energetic materials for propellants and explosives
• Theoretical Chemistry	• Ten times more powerful chemical lasers
• Polymer Chemistry	• New polymer materials
• Biomimetic Sensors	• Biomimetically enhanced sensors
• Chronobiology and Neural Adaptation	• Strategies to reduce fatigue
• Information Fusion	• Command & control decision making
• Perception and Cognition	• Better personnel training, selection, and classification
• Switchable, Tunable Optical Filters	• Versatile laser protection
• Adaptive Bio-Materials	• New class of highly functional light weight polymeric materials

MATHEMATICS AND SPACE SCIENCES

Technologies	Capability/Payoff
• Dynamics and Control	• Modeling of complex problems and systems
• Physical Mathematics and Applied Analysis	• Control of vibrations and shape of space structures
• Computational Mathematics	• Better vehicle performance and control
• Optimization and Discrete Mathematics	• New methods for target acquisition and recognition
• Systems, Software, and Reliability	• Detection avoidance
• Artificial Intelligence	• Timely management of information
• Electromagnetics	• Improved solar and space environment forecasting
• Space Physics and Solar Phenomena	• Protection of space assets
• Spectral Imaging	• ID Targets Under Trees
• Upper Atmosphere Laser Beam Propagation	• ABL Targeting Through Turbulence

AFOSR FUNDING PROFILE
(FY01)

5000 Researchers

AFOSR Ballston

Air Force 6.1 Funding

30%

AFRL Technology Directorates
132 Projects

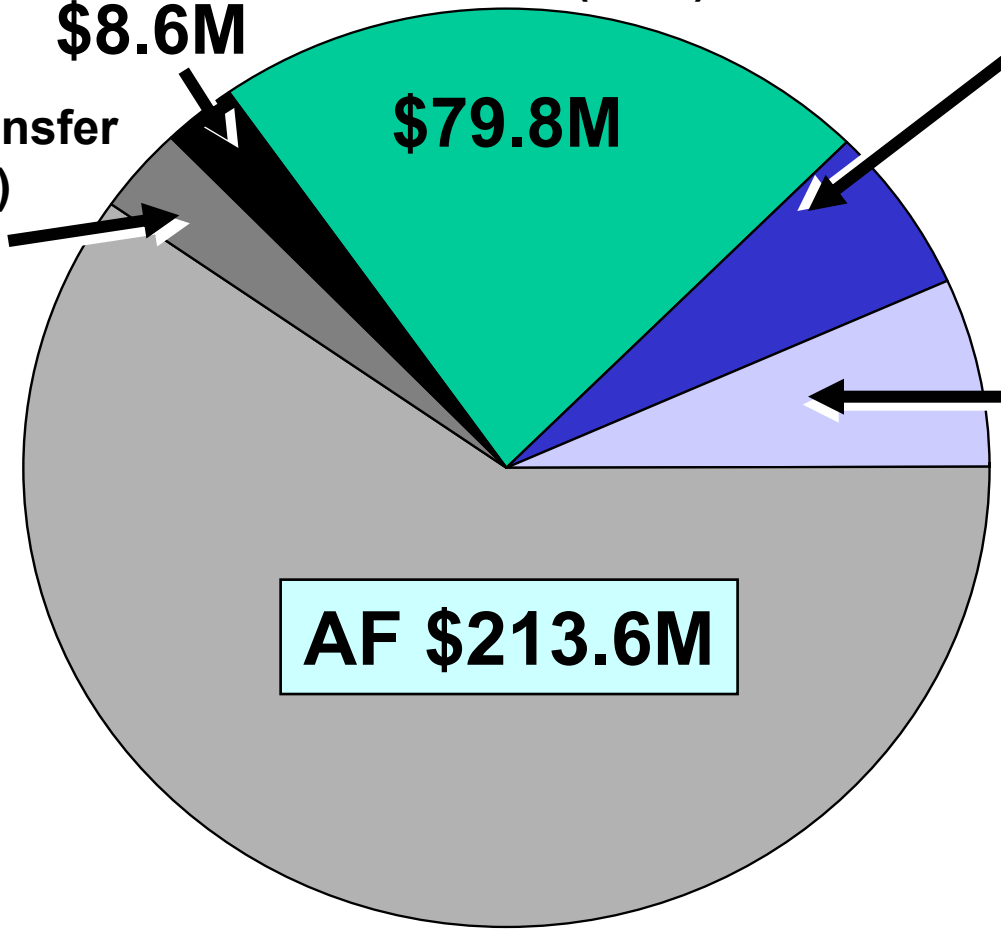
60%

188 Universities
952 Grants

10%

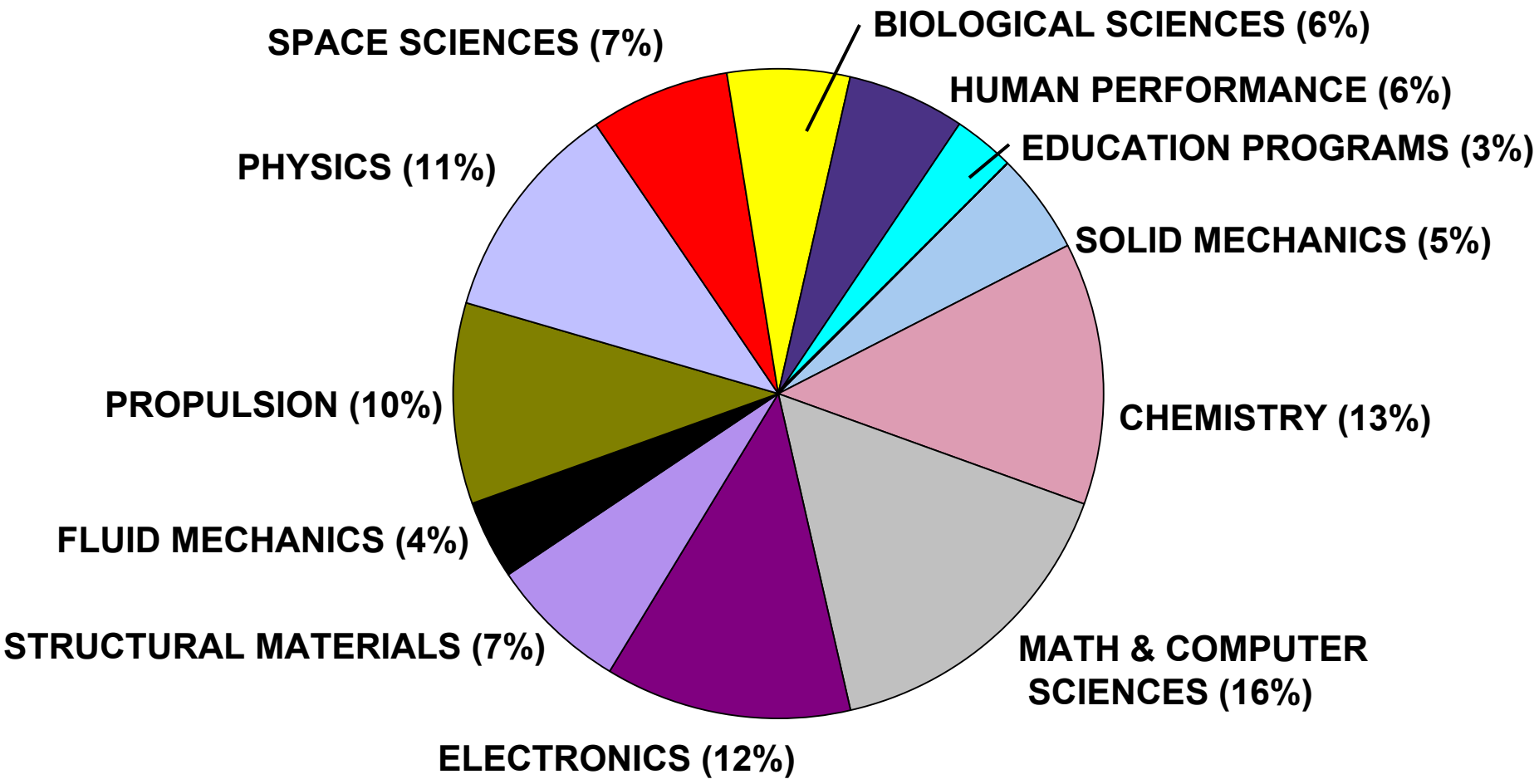
Industry
179 Contracts

FY 01 FUNDING TO AFOSR ($M)



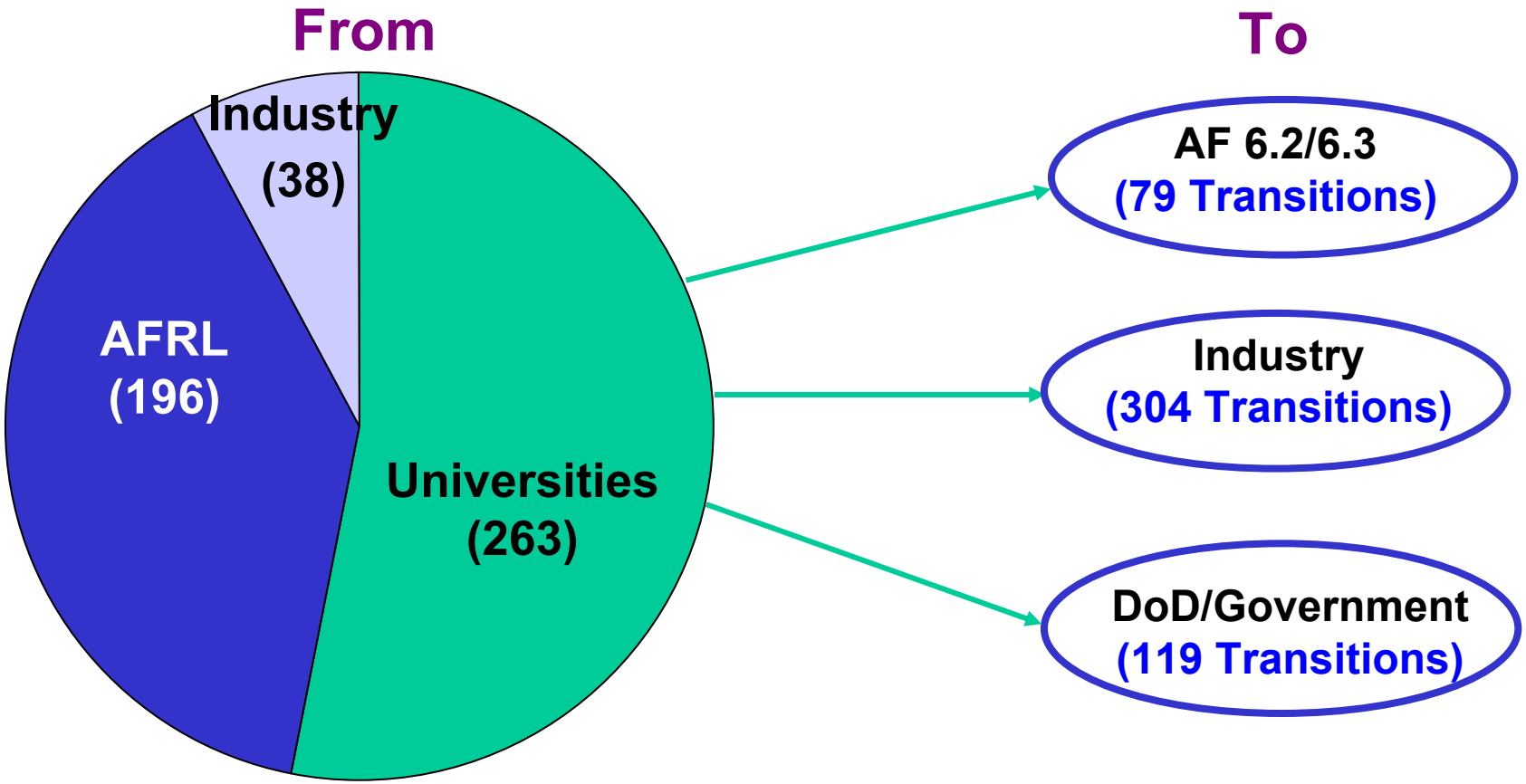
Other includes:
NSA
ONR
NASA
Army

FY02 AF 6.1 INVESTMENT BY DISCIPLINE



BASIC RESEARCH TRANSITIONS
(FY00)

497 Documented Transitions
From 6.1 to 6.2 and Above



Sums of categories exceed fiscal year total due to more than one customer per transition

HOW AFOSR OPERATES

- AFOSR sets direction from top level guidance
  - AF Scientific Advisory Board, AFRL, AF, & DoD
- AFOSR annually updates its Broad Agency Announcement (BAA)

  AFOSR WebPage: www.afosr.af.mil
- Proposals from Universities, Industry, and AFRL Technical Directorates
- Proposals rated for Excellence: External And Internal review panels
- Proposals rated for Relevance: AFRL & AFOSR

RESEARCHER ASSISTANCE AND SPECIAL PROGRAMS

Researcher Assistance Programs --

Foster the Mutual Research Interests of the Air Force and Universities

Fellowship Programs:

- National Research Council Resident Research Associateship Program (NRC-RRA)
- NRC Summer Faculty Fellowship Program
- DoD National Defense Science & Engineer Graduate Fellowship Program
- Presidential Early Career Award Science & Engineer (PECASE)

RESEARCHER ASSISTANCE & SPECIAL PROGRAMS (Cont'd)

- **Special Programs**

- **Small Business Technology Transfer**

- **Historically Black Colleges and Universities**

- **Window Programs / Windows on Science**
  - **AFOSR sends researchers from the U.S. to Asia, Europe, Canada, Central and South America and internal U.S. sites. (Windows)**
  - **Average visit is 1-6 months**
  - **Researchers come to the US from these countries to lecture (WOS)**
  - **Average visit is 2-4 weeks**

National Research Council (NRC) Associateships

- **Objectives**
  - Enhance research program of the host laboratory-- fresh ideas & enhanced networking with R&D community
  - Provide prestige of national program
  - Provide outstanding research experience for the Associate
- **Value Added**
  - Proven selection process
  - Effective NRC management at modest cost (18%)
  - Participate in National program (Lab and mentor approved by NRC)

AFOSR provides centralized administration

AFOSR OPERATIONS

- AFOSR is a Technical Management Operation
- AFOSR has No Infrastructure
- AFOSR Performs No In-house Research
- AFOSR Overhead is Small Percentage of Total Budget
- AFOSR Consistently Meets or Exceeds Air Force Financial Goals

INVESTMENT STRATEGY

- Investment is *High-Risk* and *High-Payoff*
- *Invest Broadly* for *Revolutionary* Air Force Technologies
- *Always Flexible* - Don't Stagnate
  - 3 Year Grants, 1 Year Options-- Refreshes Research
  - Grant average 6 Years, but "No Entitlements"
- *Integrated* Program (6.1, 6.2, 6.3)
- *Leverage* DOD, Other Agency, Private Sector and International Research

Require *Excellence* and *Relevance*

PARTNERSHIP STRATEGY

- **Building Partnerships with Excellence and Relevance**
  Enabled by Program Manager Authority
  - **Between Several Disciplines -- fosters Innovation**
  - **Many Performers -- fosters Success & Quality**
  - **Between Users And Performers -- fosters Relevance**
  - **All Proposals -- Merit Reviewed**
- **Open-ended Broad Area Agency Announcement (BAA)**
  - **Open At All Times To Good Ideas**
  - **Program Managers Provide Focus**

IMAGING PHYSICS PROGRAM

Physics and Electronics — **Core Technologies: Signatures and Surveillance, Optical Countermeasures**

Unconventional Imaging Methods
AFOSR/NE

Precision Deployable Large Optics
R. Carreras (AFRL\DEBS)

Information Dynamics in Image Deconvolution
S. Prasad (U NM)

Low Light Dilute Aperture Imaging; Big Space Optics
J. Fender (AFRL/VS)

Spectral Polarimetric Phenomenology
T. Caudill (AFRL/VS)

Exploitation of Polarization Inf.
M. Pesses (SAIC)

Imaging Reconstruction for Space-Variant Blur
B. Thelen (ERIM)

Image Formation Theory and Analysis
M. Roggemann

Astronomical Adaptive Optics
R. Angel (Univ. of Arizona)

AF BASIC RESEARCH REVIEWED

- External Peer Review
  - Each Grant Proposal
- Individual AFOSR Program Manager
  - Grantee Presentations, Topical Workshops
- Air Force Office Of Scientific Research Director
  - AFOSR Program Manager Presentations
- Air Force Research Laboratory Commander
  - AFRL Management Review
- Chief Of Staff And Secretary Of The Air Force
  - Air Force Scientific Advisory Board (SAB)
- Office Of The Secretary Of Defense
  - Basic Research Review

AFOSR EXIT CRITERIA

- Technical Feasibility Proved: Results Transitioned
- Work Now Addressed Adequately: by Other Funding Agencies
- Air Force Requirements: Met
- Other: Higher Priority Requirements Surface
- Research Efforts: not making Reasonable Progress
- Technical Approach: shown to be Infeasible
- Research Paradigm: has Shifted
- Air Force Benefit: No Longer Exists even if Successfully Completed

EXAMPLES OF BASIC RESEARCH CONTRIBUTIONS

AFOSR-Sponsored Research Enabled:

- **Precision Navigation** [Kalman Filter - 1950]
- **Stealth Enablers** [High Frequency Electromagnetic Scattering - 1950]
- **Human-Computer Interface** [Engelbart – 1960s]
- **Airborne Laser (ABL)** [COIL - 1976-1995]
- **TechSat 21** [Next Generation]

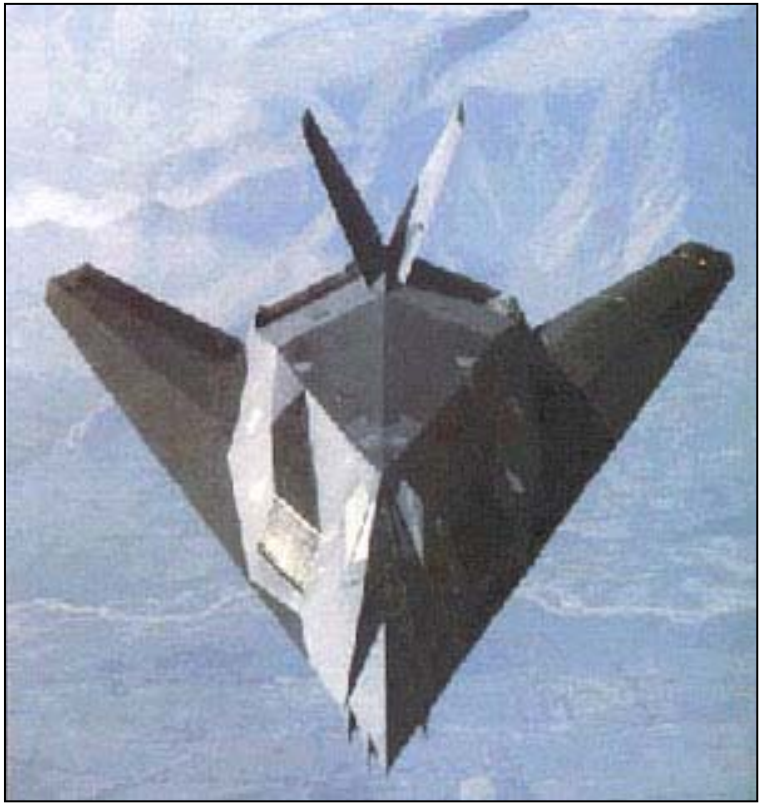
AFOSR SPONSORED RESEARCH TO IMPROVE GUIDANCE AND NAVIGATION ACCURACY

The Kalman Filter Solved the Problem Plaguing Guidance and Navigation Systems in the 1950's: How to Filter Inaccurate Data into Useful Data.

The Kalman Filter and its extensions are still widely used in the 21st Century!

Guidance and Navigation System Breakthrough

AFOSR Supported Stealth Research Beginning In the 1950's!



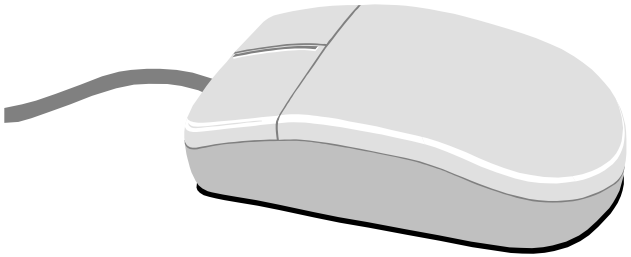
Research in High-Frequency Electromagnetic Scattering Formed the Basis for the Design of Stealth Platforms such as the F-117

A Paradigm Shift in Anti-Radar Technology

AFOSR SPONSORED RESEARCH TO INCREASE USEFULNESS OF COMPUTERS

The "Mouse" Improves Human-Computer Interface

1960's: AFOSR Sponsored Dr. D. C. Engelbart's Development of the Original "Mouse"



1990's The Mouse Increases Effectiveness of Computers in the Air Force and Industry

The Development of the Computer "Mouse" in the 1960's was a Small Part of a Large Plan to Improve Human Interaction with Computers.

A Revolution in the Human-Computer Interface!

AFOSR SUPPORTS RESEARCH ENABLING AND IMPROVING THE ABL

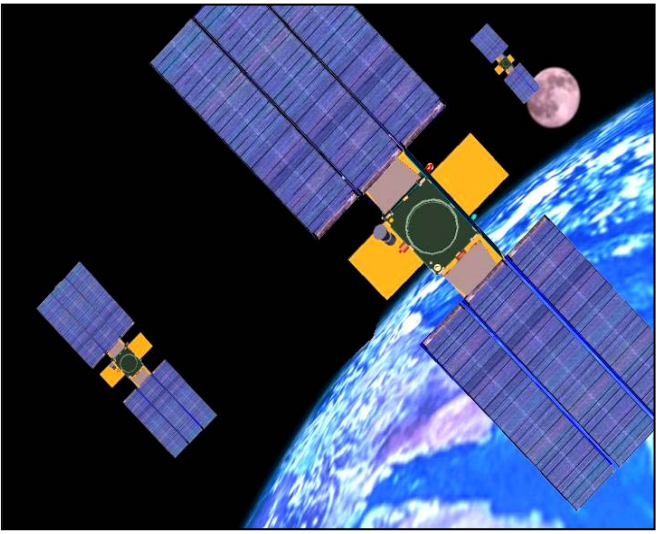
Ballistic Missile Defense Made Possible By AFOSR Research

AFOSR Sponsored Development of the *Chemical Oxygen-Iodine Laser (COIL)* used in the Airborne LASER (ABL) 1976-1995

AFOSR and AFRL/DE are Improving on COIL with Research in the *All Gas-Phase Iodine Laser (AGIL)*

AGIL Research To Improve ABL: Twice The Power, Half The Weight

MINIATURIZATION FOR SPACE
TECH SAT 21



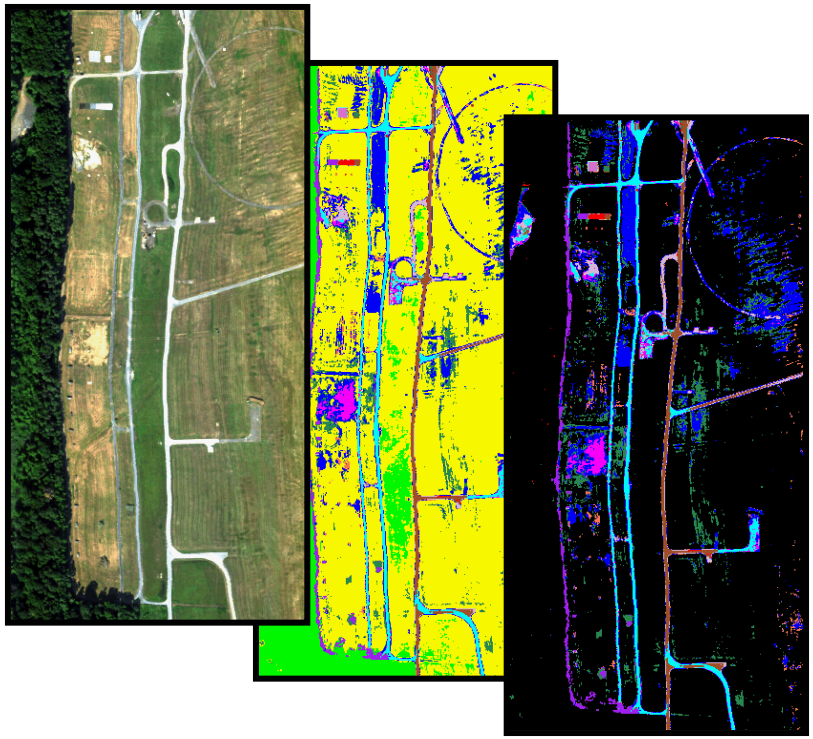
Key Technologies

- Lightweight microsat hardware (flywheels)
- Distributed sparse aperture radar function
- Partitioned, distributed processing
- Ionospheric small scale structure
- Low power, low heat, rad hardened chips
- Formation flying/micro-propulsion

Description:

- Integrated technologies enabling distributed satellite systems
- Cluster of formation flying small-sats form **"Virtual Satellite"**
- Cooperatively function as a multiple aperture sparse array

AFOSR Researchers Aided Invention of Digital Image Processing



AFOSR Supported Creation of New Digitization and Mathematical Transformation Techniques to Better Code Images.

Due to New Techniques, Bandwidth is Reduced and Fewer Image Errors Occur, Reducing Time and Money Required For Accuracy.

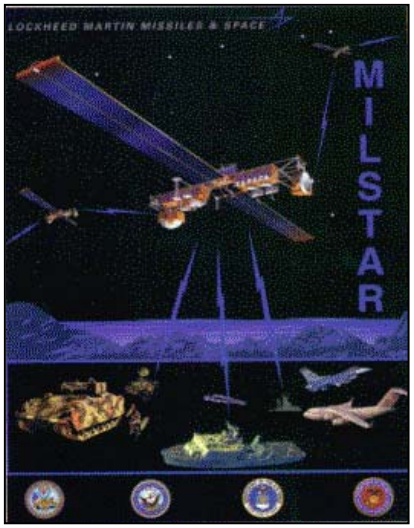
USAF Surveillance, Communications, and Data Storage Enabled Through AFOSR-Sponsored Research

AFOSR Research Ensured AWACS Performance Improvements

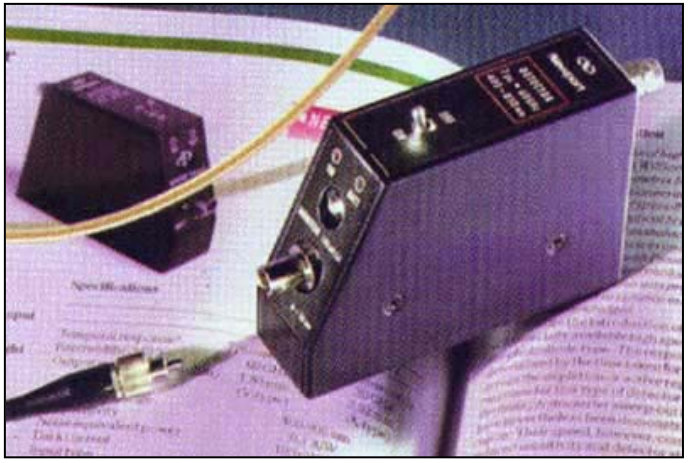
AFOSR-Supported Research Improved Surveillance Capability by Increasing Tracking Capacity, Fidelity, Maneuver Detection, Tracking Accuracy, and Sensor Fusion

AFOSR-Sponsored Research Increases Accuracy in Airborne Warning and Control Systems

New Semiconductor Material Transitions to MILSTAR Applications



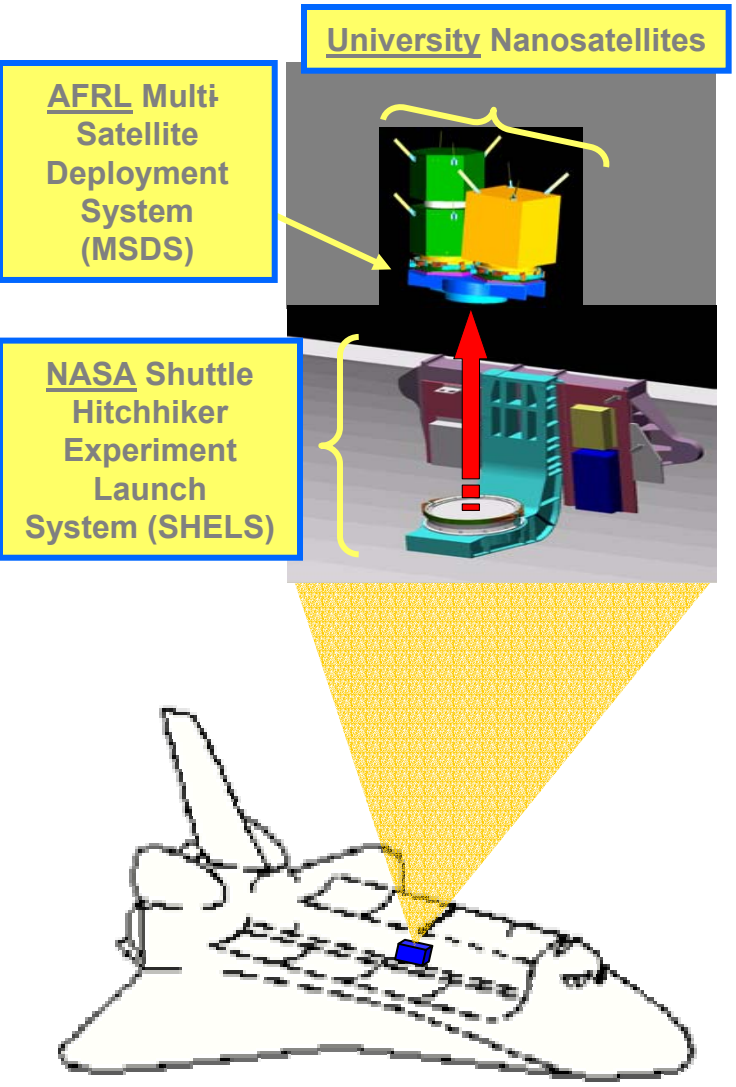
- **AFOSR-sponsored Scientists at Lincoln Laboratory and MIT** Developed New Semiconductor Material: Low Temperature Gallium Arsenide (Lt GaAs)
- **Lt GaAs Is Produced Using** Temperatures 400°C Lower than earlier forms of GaAs
- **Lockheed-Martin Built** MILSTAR Satellites Using Electronics Made From Lt GaAs
- **Lt GaAs is also Used for** the World's Fastest Commercial Photodetectors



AFOSR SUPPORTS RESEARCH ENABLING AND IMPROVING THE ABL *(CONT.)*

- Invention of LASER (1958)
- Invention of Chemical Oxygen-Iodine Laser (1976)
  - Invented By AF Captains McDermott And Pchelkin
  - Capable Of Megawatt Power Level, Highly Reliable Operation
- Atmospheric Compensation & Correction (1985)
  - Enables 95 Percent Of Power To Reach Target, instead of 5 %
- Vibration Elimination (1988)
  - Improved Pointing & Stability--Verified by KC-135 Flight Test
- Water Vapor Sensor -- 20% Increase In Efficiency
- Research new All Gas Iodine LASER (AGIL), (1995)
  - Twice The Power, Half The Weight--Lased March 2000
- Research Upper Atmosphere Laser Beam Propagation
  - Passed OSD Milestone 26 June 98

UNIVERSITY NANOSAT PROGRAM OVERVIEW



- **OBJECTIVE**
  - Leverage innovative thinking at U.S. universities to pioneer "out-of-the-box" solutions
  - Demonstrate state-of-the-art nanosatellite bus and payload technologies
  - Demonstrate advanced mission concepts such as TechSat 21 formation flying
  - Develop a standard deployment system
- **DESCRIPTION**
  - Ten U.S. universities produced nanosatellites. To be deployed via 2 flight missions from Space Shuttle
  - Organized into 3 subclusters to demonstrate formation flying, inter-satellite collaborative processing/communication, and autonomous control operations and data downlink
  - Each nanosat cluster incorporates unique technology demonstrations and science measurement capabilities

ALL NITROGEN ROCKET FUEL

Cut the cost of Delivering Payloads to Space in Half

- **By AFRL Rocket Propulsion Group, Edwards AFB, CA**
- **Signature-Free**
  - **Undetectable Rocket Launches**
- **Super Energetic Propellants**
  - **Significant Reduction in Fuel Consumption**

One of the Top Five Achievements in Chemistry in 1999
- Chemical and Engineering News

ADVANCED ELECTRO-OPTICAL SYSTEM (AEOS) TELESCOPE

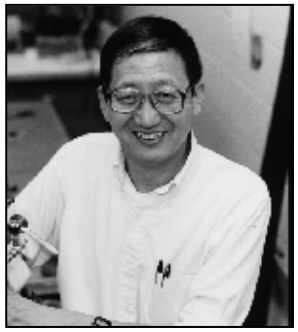
- 3.5 Meter Telescope-- Becoming available at new Maui Observation Facility
- Capable of excellent/new Basic Research
- Civilian/University Scientists and Astronomers
  - Afforded the Opportunity to use the Air Force's largest and most advanced Telescope System

RECENT AFOSR-SUPPORTED NOBEL LAUREATES

PROF. STEVEN CHU
STANFORD UNIVERSITY

Physics 1997

PROF. DANIEL CHEE TSUI
PRINCETON UNIVERSITY

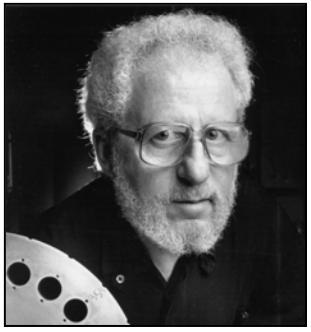


Physics 1998

PROF. AHMED ZEWAIL
CALTECH

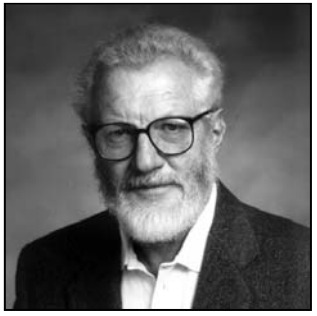
Chemistry 1999

PROF. ALAN J. HEEGER
UC, SANTA BARBARA



Chemistry 2000

PROF. HERBERT KROEMER
UC, SANTA BARBARA



Physics 2000

PROF. PAUL GREENGARD
ROCKEFELLER UNIVERSITY

Medicine 2000

38 NOBEL LAUREATES PERFORMED AF-SPONSORED BASIC RESEARCH BEFORE AWARDS

1997 NOBEL PRIZE AWARDED TO AFOSR RESEARCHER

Dr. Steven Chu

Stanford University 1997

Nobel Prize in Physics

"Development of Methods to Cool and Trap Atoms with Laser Light"

- **AFOSR, together with the NSF, funded Dr. Chu's Research in the Techniques of Optical Cooling and Trapping of Atoms**
- **Lightweight, Extremely Accurate Frequency Standards**
- **Super-Stable Atomic Clocks**
- **Precision Navigation Highly Sensitive Accelerometers**
- **Interferometers**

1997 NOBEL PHYSICS PRIZE DEVELOPED METHODS TO COOL AND TRAP ATOMS WITH LASER LIGHT

POTENTIAL APPLICATIONS

- LIGHTWEIGHT, EXTREMELY ACCURATE FREQUENCY STANDARDS
- SUPER-STABLE ATOMIC CLOCKS
- PRECISION NAVIGATION
- HIGHLY SENSITIVE ACCELEROMETERS
- INTERFEROMETERS

1998 NOBEL PRIZE AWARDED TO AFOSR-SUPPORTED RESEARCHER

Dr. Daniel Tsui

Princeton University

- **1998 Nobel Prize in Physics**
- **Awarded for Discovery of the *Fractional Quantum Hall Effect***
- **AFOSR Supported his work at Princeton after he left Bell Labs**
- **AF Application is Higher Resolution EM Radiation Detectors**

1999 NOBEL PRIZE AWARDED TO AFOSR-SUPPORTED RESEARCHER

Dr. Ahmed Zewail

California Institute of Technology

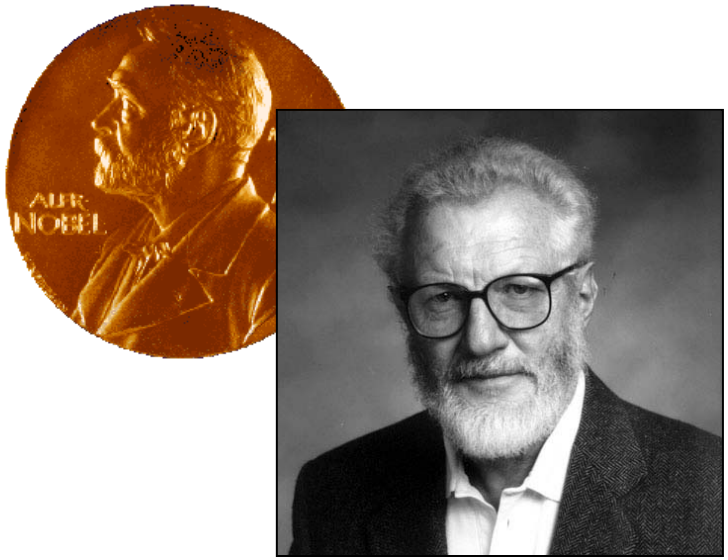
- **1999 Nobel Prize In Chemistry**
- **Dr. Zewail is recognized for his pioneering efforts using Ultra-Short Laser Flashes to Monitor Chemical Reactions (Femtochemistry)**
- **AF applications focus on understanding and controlling the release of energy in chemical reactions in systems such as:**
  Novel Rockets Propellants, Chemical Lasers, and the Interactions of Aerospace Vehicles with their Environments

2000 NOBEL PRIZE AWARDED TO AFOSR-SUPPORTED RESEARCHER

Prof Alan J. Heeger
UC Santa Barbara

- **2000 Nobel Prize in Chemistry**
- **The discovery and development of conductive polymers**
- **Funded by AFOSR Since 1986**

2000 NOBEL PRIZE AWARDED TO AFOSR-SUPPORTED RESEARCHER



Prof Herbert Kroemer
UC Santa Barbara

- **2000 Nobel Prize in Physics**
- **Developing semiconductor heterostructures used in high-speed- and opto-electronics**
- **Funded by AFOSR's PRET Program Since 1995**

2000 NOBEL PRIZE AWARDED TO AFOSR-SUPPORTED RESEARCHER

Prof Paul Greengard

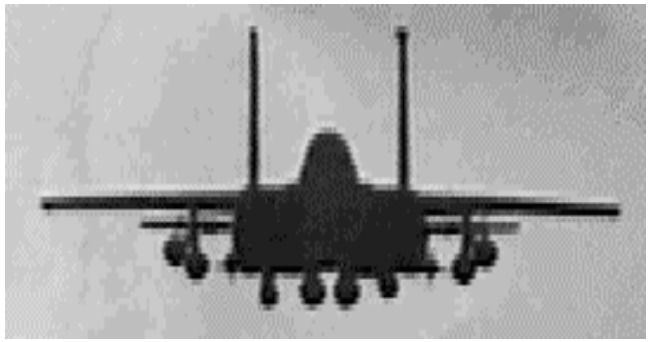
Rockefeller University

- **2000 Nobel Prize in Medicine**
- **Discoveries concerning signal transduction in the nervous system**
- **Funded by AFOSR From 1983 to 1986**

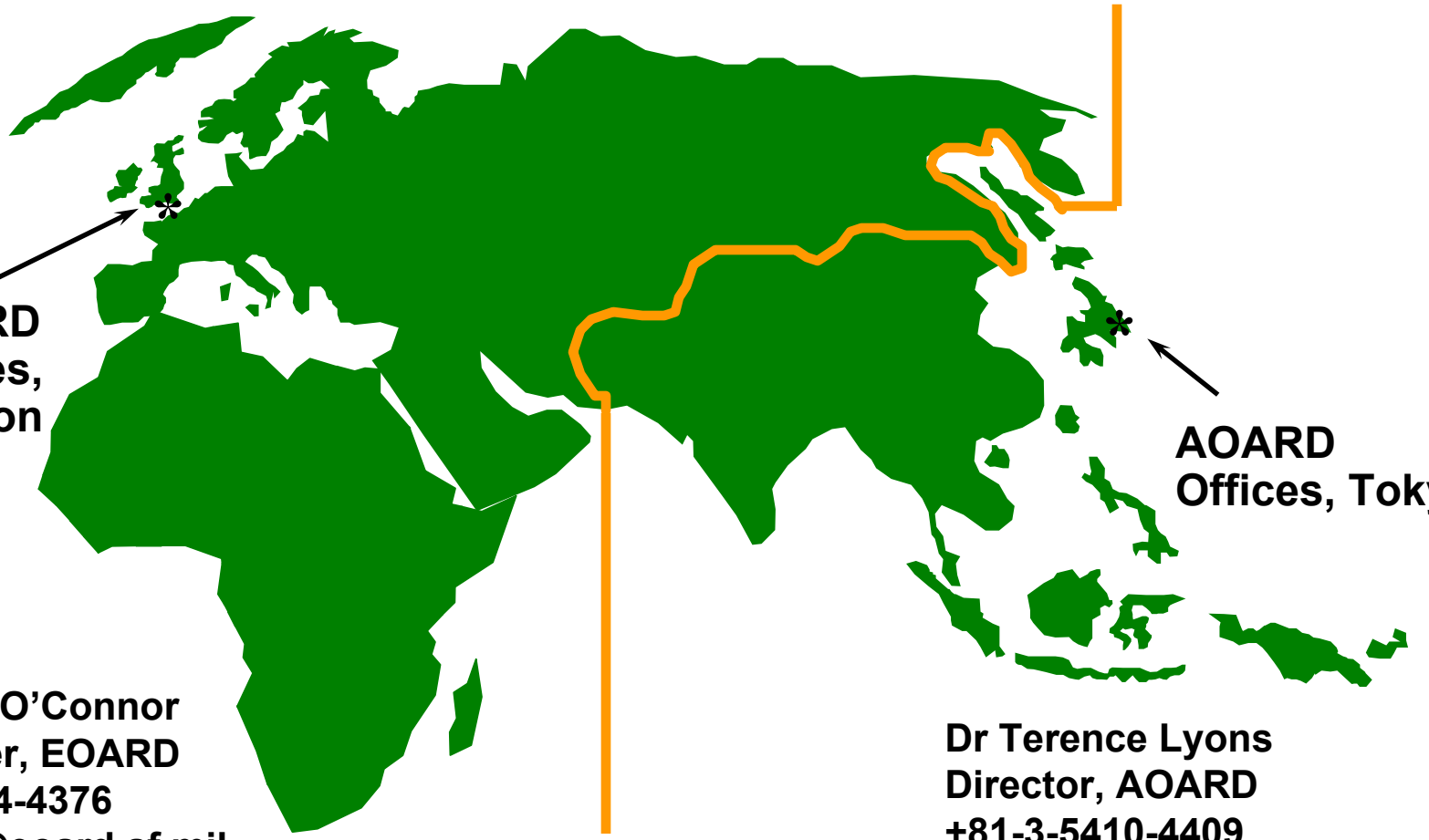
EUROPEAN & ASIAN OFFICES OF AEROSPACE RESEARCH AND DEVELOPMENT (EOARD & AOARD)

Leverage overseas expertise and technologies for Air Force & DoD customers

- Transition world-class basic research
- Represent AFRL Technical Directorate applied and advanced research interactions
- Leverage foreign investment/AF S&T $'s
- Satisfy higher-level AF priorities



EUROPEAN & ASIAN OFFICES OF AEROSPACE RESEARCH AND DEVELOPMENT (EOARD & AOARD)



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AFOSR
INTERNATIONAL ROLES & FUNCTIONS

- **Policy & Strategy**
  - **Implements International Enterprise policy & strategy**
  - **Provides Vice Chair of Research Council (AFOSR/CC)**

- **Execution**
  - **AFOSR/CC manages European and Asian Offices of Aerospace Research & Development (EOARD/AOARD)**
  - **Manages international research programs**
  - **Administers Window Programs**
    - **Window on Europe, Asia and the Americas**
  - **Administers Engineer & Scientist Exchange Program (ESEP)**
  - **Provides the AFRL International Office**

AFOSR/CC Accountable for a Cohesive, Integrated AFRL International Enterprise

AOARD and EOARD Mission

- **Mission is to...**
  - Seek Out AF-relevant, Cutting-Edge Science & Technology (S&T)
  - Communicate with Air Force Research Laboratory (AFRL) Management, International Office and Scientists and Engineers
  - Foster Opportunities for Interaction with Counterparts in Areas of Responsibility
- **Major Programs**
  - Window on Science, Conferences, Contracts

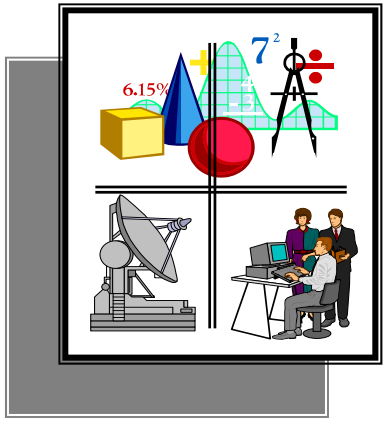
CONFERENCE SUPPORT PROGRAM

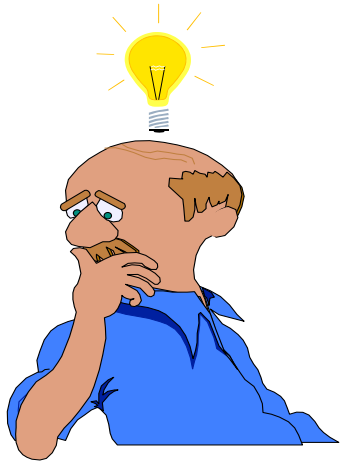
- **Designed to promote conferences and workshops focused on topics of interest to the DoD**
  - Facilitate attendance/access by US researchers
  - Expand availability of proceedings to US
  - Important adjunct to Window on Science
- **Often done jointly with**

  US Navy and/or US Army
- **Typically <$5000 for conference**
- **Focus on smaller workshops**

WINDOW ON SCIENCE

- Our “flagship” program
- Private (non-government) scientists invited to visit US to brief their research/public domain discussions
- Covers cost of transportation, lodging, & honorarium to lab, conference, etc.



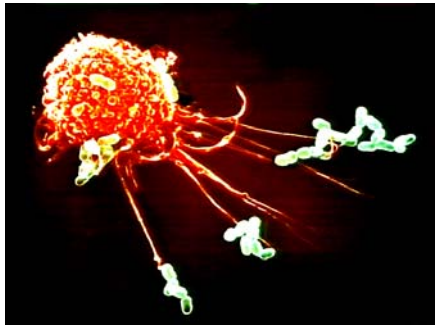


RESEARCH PROJECTS

- **Small research projects at universities/institutes**
- **Proposals in response to AFRL BAA(s)/PRDA(s)**
  - Range: $1,000-$600,000, 1 year/$25,000 is norm

Low Cost Titanium

Polar Cusp/Cap Research



Artificial Immune Network

GROWTH OF AOARD

- AFRL/AFOSR Det. 2 established in 1992
- Located in Central Tokyo (Stars & Stripes DOD Complex)
- Collocated with Navy and Army Counterparts:
  - Office of Naval Research International Field Office Asia
  - Army Research Office Far East

AOARD PERSONNEL

Director & Technical Director

• Dr. Terence J. Lyons	Director, Life Sciences
• Lt Col Mark Nowack	Technical Dir., Aerospace Science

Program Managers & Science Advisor:

• Ms. Joanne Maurice	Electronics, Optics & Physics
• Dr. Tae-Woo Park	Mathematics
• Dr. Ken Goretta (IPA)	Materials and Structures
• Dr. Takao Miyazaki (MLC)	Electronics, Physics, & Misc.

Part-time Staff:

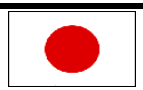
• Dr. Brett Pokines (1/2 time IPA)	Micro systems
• Lt Col John Brewer (1/12 time, USAFR)	Biotechnology, RFR Bio-effects
• Dr. Ed Feigenbaum (1/12 time, contract)	Computer Science
• Dr. Ted Sumrall (1/4 time, MN contract)	Munitions, Propulsion

Management Support Section:

• Mr. Julian Jaime	Chief of Admin., Fin., & International
• TSgt Michael Adams	Computer System Administrator
• Ms. Etsuko Hiwatashi (MLC)	Technical Information Specialist
• Ms. Michiko Mikami (MLC)	Technical Information Specialist
• Mr. Yoshiya Erikawa (MLC)	Technical Information Specialist

FY1994-2001 ACTIVITIES TO DATE

By Country

COUNTRIES	
	Japan
	Australia
	South Korea
	China
	India
	Singapore
	Taiwan
	New Zealand
	Mongolia
	Malaysia
	Vietnam
	Thailand

Activity	Total
Windows on Science	269
Conference Support Program	125
R&D Programs	67

Date of 15 Mar 2002

AOARD PM COVERAGE OF TDs

	ML	VS	HE	SN	IF	PR	DE	VA	MN
MAURICE	55%	5%		5%			25%		
PARK			45%		45%				
GORETTA	50%	10%				10%			
NOWACK	10%	5%				5%		5%	15%
POKINES	30%			20%					
FEIGENBAUM					8%				
BREWER			8%						
SUMRALL						8%			16%

EOARD Manning

- **Commander**
- **9 Support staff**
  - 2 Admin
  - 2 Finance
  - 2 Contracting (1 new)
  - 1 Info Assurance
  - 2 In-house contractors
- **9 Program Managers**
  - 3 Military PhD's
  - 3 Civil Service PhD's
  - 2 IPA PhD's
  - USAFA Professor (Col) on Sabbatical
    - To be new HE-furnished slot
- **PM's "roughly" map to AFRL Directorates**

Space Wx/RF
Lasers/EO
Aero/Propulsion
Information
Materials
Human Factors
Space/BMDO
Physics
Mathematics

EOARD FY01 Program Summary

247 WOS's/81 Conference/114 Projects ($7,317K)

ARGENTINA	GERMANY	ROMANIA
ARMENIA	GREECE	RUSSIA
AUSTRIA	HUNGARY	SLOVAKIA
BELGIUM	IRELAND	SLOVENIA
BRAZIL	ISRAEL	SPAIN
BULGARIA	ITALY	SWEDEN
CANADA	LATVIA	SWITZERLAND
CROATIA	LEBANON	TURKEY
CZECH REP	LITHUANIA	UKRAINE
DENMARK	NETHERLANDS	UNITED KINGDOM
EGYPT	NORWAY	
FRANCE	POLAND	

SUMMARY

- **AFOSR focuses the *Scientific Community on Air Force Warfighter Needs***
- **AFOSR forges *Transitions of Innovative Technologies***
- **AFOSR has a reputation for *Early and Accurate Selection of Premier Research Scientists***
- ***AFOSR is eager to invest and cooperate with international partners***

BACKUP CHARTS

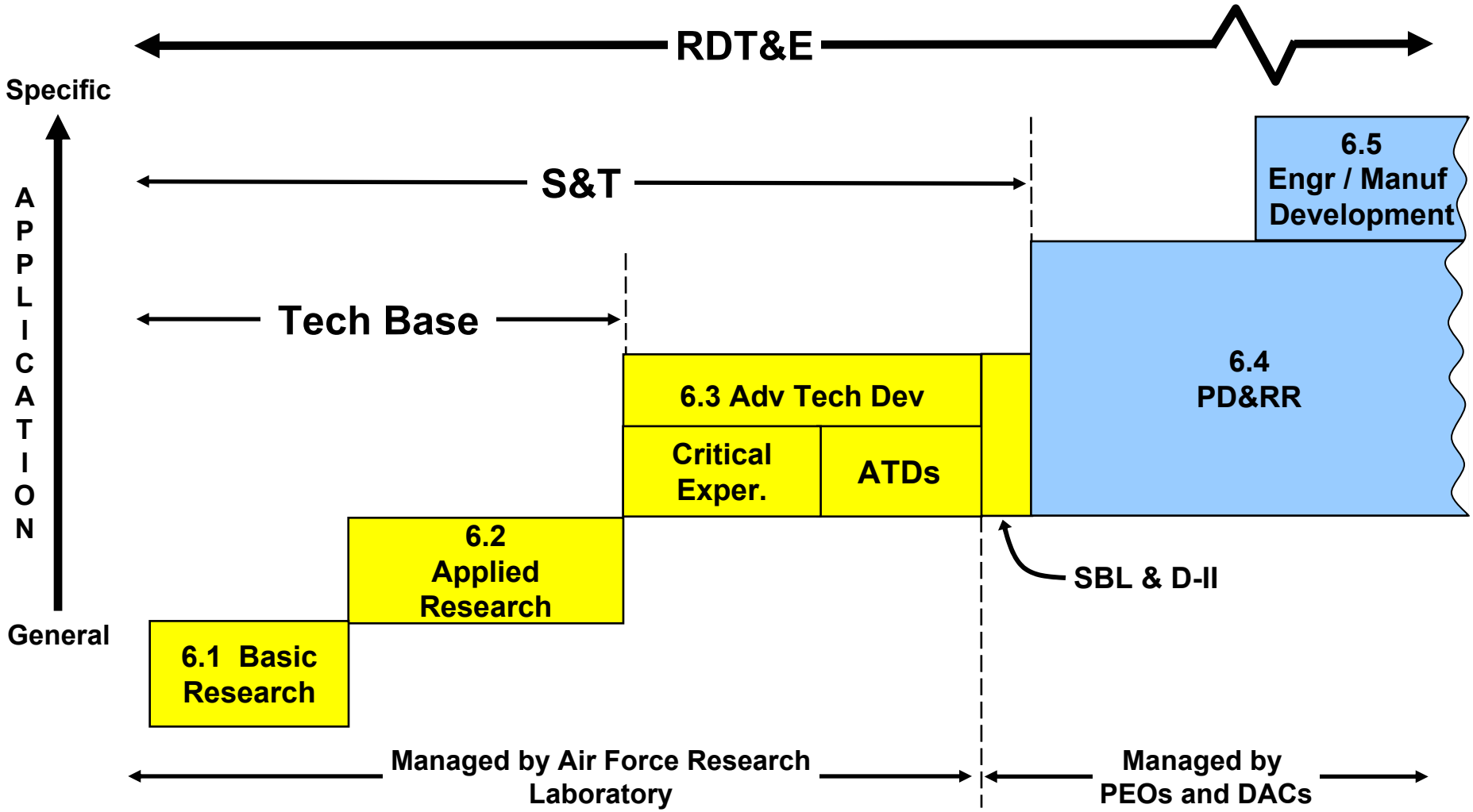
Applied Technology Councils (ATC)

Tech Transition problem surfaced at recent Quarterly Acquisition Program Review (QAPRs)

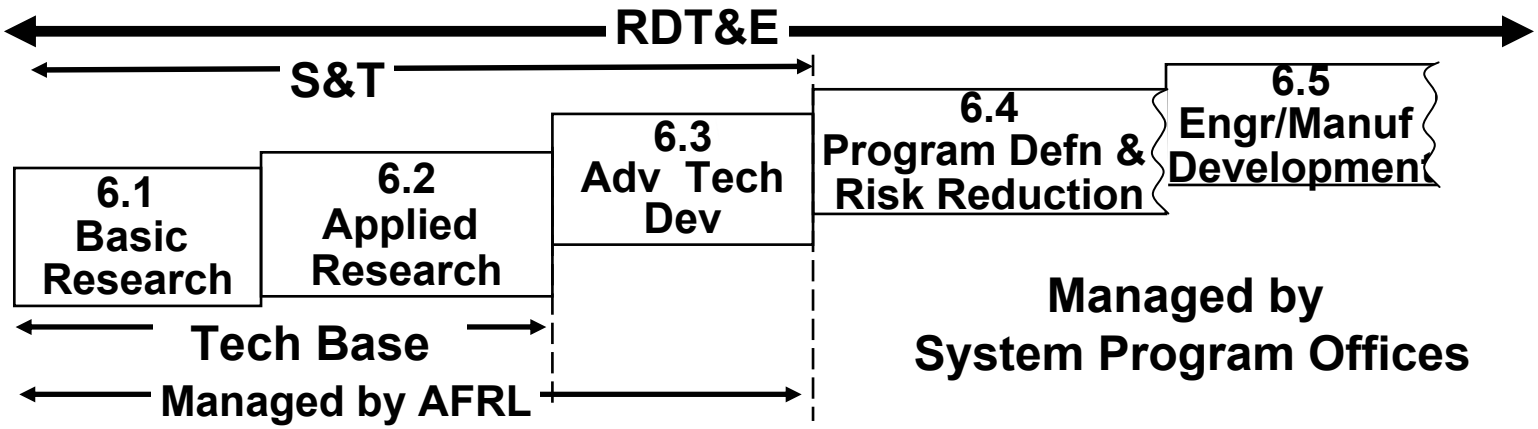
- Funding disconnect between S&T (funded) and programs (largely unfunded)

Applied Technology Councils proposed as a solution

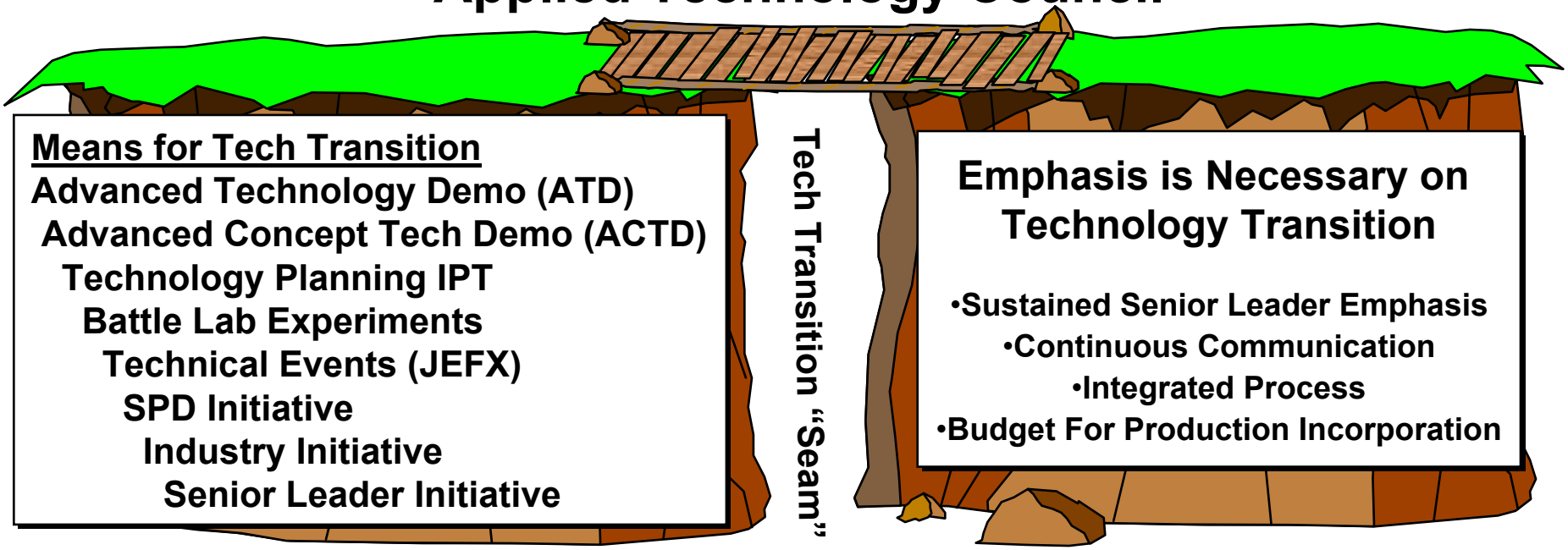
Major Force Program 6 Relationship
(3600 Appropriation)



The Problem



Applied Technology Council



Means for Tech Transition

- Advanced Technology Demo (ATD)
- Advanced Concept Tech Demo (ACTD)
- Technology Planning IPT
- Battle Lab Experiments
- Technical Events (JEFX)
- SPD Initiative
- Industry Initiative
- Senior Leader Initiative

Tech Transition "Seam"

Emphasis is Necessary on Technology Transition

- Sustained Senior Leader Emphasis
- Continuous Communication
- Integrated Process
- Budget For Production Incorporation

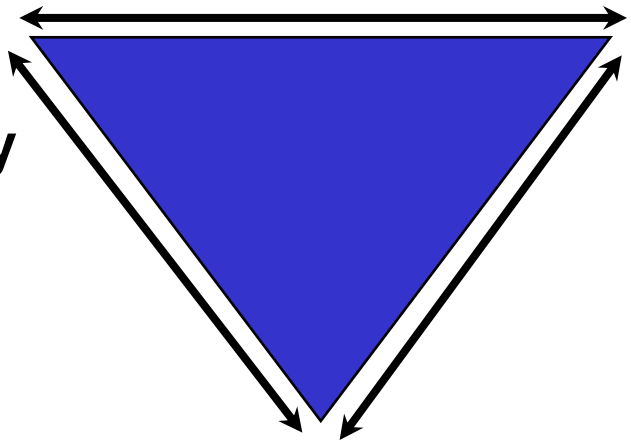
The ATC Triangle

Lab (☝)

- Identify ATD Candidates
- POM for Technology Programs
- Develop Transitionable Technologies

User (☝☝☝)

- Define Requirements
- POM Transition Funds



SPO (☝☝☝)

- Interpret Requirements
- Build Transition Program
- Integrate Into Systems

ATD Categories

Category	Action
Category 1: Warfighter supports and has POM'd for transition (6.4 and beyond)	Continue ATD
Category 2A: Warfighter committed to work in FY02 POM cycle	Continue ATD until next ATC
Category 2B: Warfighter supports but is unable to POM for transition	Continue ATD until next ATC
Category 3: Warfighter does not support	Do not establish as ATD

Observations

- **Process has opened dialogue and promoted education up through senior levels**
- **AFRL is pursuing ATDs supported by warfighters**
- **FY02 POM will be clear indication of MAJCOM's ability to fund ATD transition**
  - Difficult for ATD transition to compete in MAJCOM POM process
  - MAJCOMs reluctant to insert budget wedge
    - Vulnerable to cuts in budget process
  - "Show me" first approach